TABLE OF CONTENTS

CHAPTER 2

LIST OF TABLES

LIST OF FIGURES

2.0 ALTERNATIVES

This chapter describes four alternatives, including the No Action Alternative, considered in detail in this EIS. How the build alternatives were developed is described, as is selection of the Preferred Alternative. Also discussed are alternative routes that were considered but not carried forward for detailed analysis.

2.1 ALTERNATIVE DEVELOPMENT

The alternative development process for this project included determining major public and agency issues and concerns, identifying appropriate design criteria, evaluating alternative routes that avoided all or part of the existing Fernan Lake Road, and using the Interactive Highway Safety Design Model (IHSDM) for rural two-lane roads in the final evolution of the build alternatives analyzed in this EIS.

Major Issues

FHWA held several meetings with the public, partner agencies, and regulatory and resource agencies to identify the issues and concerns associated with the proposed project. The scoping process is described in greater detail in Chapter 6. Major issues identified by the public and agencies include:

1. Changes in safety and traffic operations, especially in Segment 1 where most accidents have occurred.

2. Changes in water quality of Fernan Lake.

3. Encroachment of road features into Fernan Lake.

4. Potential for landslides related to construction on steep slopes, including changes in sediment loading to Fernan Lake.

5. Changes in recreation access and scenic qualities along the road corridor.

6. Changes in cultural resources along the road that are eligible for listing in the National Register of Historic Places.

7. Changes in wetland amount, function, and value.

8. Changes in fish and wildlife habitat and populations, particularly those listed under the Endangered Species Act.

9. Changes in traffic volumes, development patterns, and right-of-way (ROW) requirements related to the proposed road improvements.

The following sections briefly describe these issues. Many issues are also reflected in the project objectives presented in Chapter 1.

Traffic Safety and Operations

More accidents and fatal accidents have occurred on Fernan Lake Road, especially in Segment 1 along the lake, than is typical of rural roads in Idaho. Thus improving safety is a primary purpose of the project. Residents along the lake expressed concerns that proposed improvements would promote faster traffic and make driveway approaches to the road more dangerous than they currently are. There are also safety concerns resulting from the lack of well-defined parking areas and bike or pedestrian lanes along the road.

Lake Water Quality

Fernan Lake is a popular destination for many uses because it is close to Coeur d'Alene and easily accessed from I-90. But the lake is shallow, relatively small, and often experiences blooms of blue-green algae in summer. Any activities that might increase nutrient loading to the lake could create an undesirable trophic state and worsen water quality.

Lake Encroachment

Because Fernan is not a large lake, substantial additions of riprap or fill into the lake to widen the road or improve its curves would cause a proportionately greater reduction in lake volume than might otherwise be the case. This in turn could make the lake more susceptible to a deterioration of trophic state and water quality. Encroachment by riprap and retaining walls could make bank fishing more difficult. Ongoing encroachment by fill for the current roadway across Lilypad Bay is a concern because there is poor water exchange through its culverts.

Construction on Steep Slopes

For most of Segment 1 (MP 0.0 to MP 2.2) and part of Segment 2 (MP 2.2 to MP 5.0), there would be substantial cuts into the existing steep slopes and/or construction of retaining walls along the road corridor to allow for the wider road, safer curves, and stormwater treatment. In recent years, lot development on Fernan Hill triggered a landslide that impacted local utilities. Additionally, a major landslide associated with a road project dumped massive quantities of sediment in Coeur d'Alene Lake. The recent Fernan Lake Watershed Management Plan (FLWTAC, 2003) recommended against developments on slopes greater that 35 percent. The City of Coeur d'Alene adopted this recommendation.

Recreation Access and Scenic Qualities

Opportunities for a wide range of recreational activities exist along or are accessible from Fernan Lake Road. These include fishing, boating, water/jet skiing, bicycling, walking/running, hiking, bird watching, berry picking, snowshoeing, cross-country skiing, ATV use, hunting, camping and snowmobiling. Fernan Lake Road passes through or along a wide variety of habitats as it climbs from the shores of Fernan Lake to Fernan Saddle. Much of the project corridor passes through a second growth Douglas-fir forest. Steep slopes above Fernan Creek are sparsely vegetated with scattered Douglas fir, western white pine, western larch, ponderosa pine, grand fir, western red cedar, and mountain maple. Distinct plant communities occur along the project corridor.

Cultural and Historic Resources

Prehistoric or Native American historic properties may include archaeological sites that represent residential areas, campsites, lithic scatters, resource processing locations, petroglyphs, pictographs, hunting blinds, stone cairns, or burial locations. Also important are places or resources that have traditional cultural importance to contemporary American Indians now represented by tribal governments. Particularly important are cemeteries and isolated interments, sacred landforms, ceremonial sites, rock art, cairns, certain animal and plant resources, and locations prominent in mythology and tribal history. Other cultural remains represent the activities of Euroamericans in the region for the last two centuries. These remains include buildings, structures, and sites associated with agriculture and settlement (e.g., homesteads, irrigation systems, fences, corrals), mining (e.g., tunnels, tailings, mills, camps), logging (e.g., mills, spur railroads, camps, equipment), the development of regional transportation (e.g., roads, railroads, associated construction camps, maintenance facilities), and federal administration (e.g. U.S. Forest Service roads, trails, ranger stations, lookouts, experimental stations, other facilities).

Wetlands

Fernan Creek and Fernan Lake are the major hydrological features in the vicinity. The wetlands in Segment 1 are located to the north of Lilypad Bay and the road fill that crosses it. Wetlands in Segment 2 are associated with Fernan Creek. Fernan Creek and runoff from the east hillside provide hydrology for the wetland areas and often are immediately adjacent to the road. Wetland impacts are unavoidable if the existing road is improved, so minimizing and mitigating these impacts are a concern.

Fish and Wildlife

Wild cutthroat trout, brook trout, and stocked rainbow trout account for over 40 percent of the catch in Fernan Lake with warm-water species, including largemouth bass, catfish, crappie, perch, and northern pike accounting for the rest. Two native, wild fish species exist in the project area (torrent sculpin and west slope cutthroat trout). A small portion of the Fernan Creek watershed consists of mature forest, which is suitable habitat for northern goshawk and pileated woodpeckers. In addition white-tailed deer, moose, and elk inhabit the Fernan Creek watershed. There has been an active and productive bald eagle nest on the south shore of Fernan Lake for several years.

Land Use and Right-of-Way

Land uses abutting Fernan Lake Road are suburban residential and recreation in Segment 1 and agricultural (grazing) and rural residential in Segment 2. Segment 3 is located entirely within the IPNF. Segment 3 uses include, timber harvesting, hunting, recreation (a shooting range), and National Forest-related activities such as trails for year-round hiking and all-terrain vehicle (ATV) and snowmobile use. In Segments 1 and 2 Fernan Lake Road is located on an 18.3-m (60-ft) wide easement that for the most part overlays existing private lots along the route.

Design Criteria Options

The build alternatives have been developed for a forest highway that accommodates single-unit vehicles (e.g., motor homes, mini-buses). The design speed would vary along the length of the road. For Segment 1, along the lake, the design speed is 40 km/h (25 mph). For Segments 2 and 3, through the Fernan Creek Valley and the National Forest sections of the road, the design speed is 60 km/h (35 mph). These design speeds are consistent with existing posted speeds and the character of the road.

1. Roadway Width

The roadway top width (outside shoulder edge to outside shoulder edge) would typically be 7.4 m (25 ft) for the portions of the project that would be reconstructed, that is, all of Segments 1 and 2. The roadway width was selected based on IHSDM results, which showed that preliminary designs using the wider design standards of AASHTO and ITD were not safer for this road. In addition, drainage ditches, rockfall ditches, and guardrail allowances would be provided as needed along the length of the reconstructed segments of the road. The overlay of Segment 3 would match the existing roadway surface width (approximately 7.6 m [25 ft]).

2. Retaining Walls

Construction of the build alternatives would require new cut and fill slopes in Segments 1 and 2. Along the existing alignment, cut slopes would reach as high as 18 m (58 ft). In some cases, the underlying rock is stable and no retaining wall would be required. In other places, retaining walls are proposed to ensure slope stability or minimize the total area of disturbance.

Different types of retaining walls would be used, depending on the location and purpose of the wall. Fill-side retaining walls are used in areas where it is necessary to elevate the road, for example, where the road is currently below the 100-year flood elevation. Fill-side walls are also used when it is necessary to widen the road on a down-sloping hillside where an embankment fill would not be appropriate, for example, adjacent to the lake.

In areas where cut slope retaining walls are needed, but there is very little room to widen into the slope, soil nail walls with a simulated stone, cast-in-place concrete face are proposed. The simulated stone surface is more attractive than a flat concrete wall, but it cannot be planted. As a result, the appearance would always be that of a man-made structure.

3. Guard rails

Guardrails would be installed in areas where steep drop-offs or other roadside hazards, such as Fernan Lake, exist. Installation of guardrail would add 1.0 m (3 ft) to the width of the roadway. In addition, AASHTO guidelines recommend a “shy distance” of 1.2 m from the edge of the travel lane, that is, a wider shoulder where guardrail is installed. In Segment 1, this offset has been limited to the 0.6 m (2 ft) shoulder.

4. Treatment of Curves

Safe curve design depends on the design speed selected and the width of the road. The existing road has curves with a very short radius, which are difficult to negotiate in larger

vehicles or at higher speeds. In addition, the travel lanes are narrow and inconsistent in width with cut slopes and vegetation immediately adjacent to the curve. Some curves (particularly in Segment 1) have inadequate stopping sight distance (blind curves). Most accidents occur on these sharp curves.

The proposed design would provide a consistent radius (which is easier to negotiate) and includes widening the roadway at curves to provide additional room for maneuvering. Although all curves would be improved, there would still be some curves that do not meet AASHTO design standard for the design speed and lane width proposed for Segment 1. These curves were designed to provide maximum safety while minimizing impacts to the lake or the homes located adjacent to the road. Warning signs recommending a slower speed would be posted at these curves.

5. Drainage

The existing road has no or minimal drainage facilities (ditches, swales, detention/treatment basins, etc.). The proposed design would provide vegetated cut-side drainage ditches that would collect run-off, allow removal of contaminants and sediment before piping the run-off under the road to the lake or creek. These swales would add approximately 2 m (6 ft) to the width of the reconstructed roadway. On the cut slope side of the road, drainage swales would be combined with rock fall ditches to minimize disturbance of adjacent property. In areas where there is not sufficient room to provide a vegetated swale between the roadway and cut-slope retaining walls a drop inlet and piped system is proposed to collect and treat stormwater before discharging it to Fernan Lake. Vegetated swales would also be used on the fill slope side, between the roadway and the lake or creek in areas where there is sufficient room. In areas where there is not sufficient room to provide a vegetated swale, sheet flow across a vegetated slope planted to act as a water quality filter is proposed.

Interactive Highway Safety Design Model (IHSDM)

The Interactive Highway Safety Design Model (IHSDM) is road safety evaluation software that evaluates the potential safety impact of specific geometric designs for roads and highways. It combines elements of each of the four traditional methods of estimating current or future safety performance for a roadway into an crash prediction algorithm, minimizing the significant weaknesses of each of the traditional methods when used alone.

IHSDM was used to analyze preliminary designs for Alternatives B and D based on AASHTO and ITD design standards. Results predicted crashes would be reduced by 12 to 23 percent from existing conditions. The model was also used to evaluate the three build alternatives analyzed in this EIS. All three have narrower typical road width than AASHTO and ITD standards. They are predicted to reduce crashes by over 50 percent when compared to existing conditions, and by as much as 62 percent when compared to the No Action Alternative in the year 2026.

2.2 ALTERNATIVES ANALYZED IN THIS EIS

A great deal of effort on the part of the project partner agencies, the public, and regulatory agencies has been spent over the past several years to identify and evaluate alternative ways to meet the needs and achieve the objectives of the Fernan Lake Road Safety Improvement Project. A total of seventeen alternatives were identified by the agencies or the public. Seven closely follow the alignment of the existing road, and ten would follow other roads for much or all of the route to Fernan Saddle. Each alternative route was defined, and where possible mapped, although new road construction through NFS lands was not precisely mapped. Then a cross-functional team of FHWA staff and SEE team visited and reviewed the alternatives to assess the feasibility of making improvements, the potential impacts involved with each, and the extent to which each would meet the identified project objectives, described in Section 1.2 above.

FHWA conducted field review of preliminary designs with partner agencies.

Most of the alternatives that were evaluated would not meet the needs or address all project objectives. This was true of all of the alternatives that would have improved an alternate route and four of the alternatives following the existing road. This chapter describes the alternatives that are being evaluated for improvements to Fernan Lake Road, and documents the process of identifying and eliminating other alternatives from further consideration. Alternatives considered but eliminated from detailed evaluation are described in Section 2.5.

Four alternatives are being evaluated for improvements to Fernan Lake Road: the No Action Alternative and three build alternatives, E, Fm and G. The No Action Alternative is included both as a viable choice and for comparative evaluation as required by NEPA. The three build alternatives vary by location of the improvements, not by design standard (roadway surface width, drainage improvements, etc.).

All three build alternatives would substantially follow the existing Fernan Lake Road alignment. Preliminary designs for the three build alternatives primarily differ between MP 1.0 and MP 2.3 (Figure 2-1). Alternatives E and G differ in the location and configuration of the bridge proposed across Lilypad Bay. Otherwise both essentially follow the alignment of the existing road. Alternative Fm leaves the current alignment near MP 1.0, climbs the adjacent hillside, and while descending the hill, avoids Lilypad Bay by crossing this area farther to the north. Appendix A contains the preliminary design for Alternative G, which was determined by the SEE team to be the Preferred Alternatives, and those portions of Alternatives E and Fm that differ from Alternative G.

Figure 2-1. Build Alternatives between MP 1.0 and MP 2.3

Except for differences to accommodate the transition between Segments 1 and 2, Alternatives E, Fm, and G are very similar in Segment 2. All three raise the road profile above the 100-year flood elevation. The required widening of the road prism to accommodate the increase in road profile causes the road base to extend into wetlands and Fernan Creek channels that are immediately adjacent to the existing road. There is no difference among the three build alternatives in Segment 3.

Alternative E

Horizontal Alignment

Under Alternative E the road would be rebuilt to a typical 7.4 m (25 ft) width for the first 8 km (5 mi) and rehabilitated in Segment 3. In Segment 1 the proposed alignment remains curvilinear and essentially follows the existing alignment, mainly comprising back-to-back horizontal curves with the occasional short tangent length. Whenever possible, the horizontal alignment was developed so that the proposed edge of pavement line would not extend past the existing edge of pavement line on the lakeside of the road. This approach minimizes the impact to Fernan Lake. One substantial deviation from the existing alignment is near MP 2.0 (Station 13+100) where a 180 m (525 ft) bridge is proposed across Lilypad Bay, thereby eliminating three tight existing curves. In addition, a short section of clean jetty rock fill may need to be placed into the lake at approximately MP 1.05 (Station 12+060) to provide a base for the proposed roadway widening around this sharp curve.

There are two (2) curves within Segment 1 where physical constraints make it impractical to propose a roadway alignment that meets a minimum safe continuous operational speed for horizontal curves. The minimum radius for a 40 km/h (25 mph) design speed and using a maximum superelevation rate of 4 percent is 60 m (197 ft). Radii of 43.5 m (143 ft) and 30 m (98 ft) are proposed at approximate stations 12+100 and 12+450 respectively. The first curve at approximate Station 12+100 would require removal of a home or substantial filling into the lake to provide a 60 m (197 ft) radius curve. The second curve located at approximate Station 12+450 would require additional excavation in the vicinity of 36,000 m^3 (47,000 yd^3) and purchase of an additional 1900 m^2 (0.47 acres) of right of way or substantial filling into the lake to provide a 60 m (197 ft) radius curve. Therefore, the largest practical horizontal curves are proposed with the expectation that these curves would receive additional safety measures alerting motorists to the appropriate travel speed.

An alignment with a 60 m (197 ft.) radius curve at approximate Station 12+450 was reviewed with respect to both design consistency and crash prediction. The larger radius curve had no impact on design consistency. Both curves had nearly identical results. There is a slight reduction (approximately 1.8 percent for the corridor) in the predicted crash frequency with the larger radius curve. In the year 2026 the estimated collision frequency for Alternative E, Segments 1 and 2, is predicted to be 6.3 crashes per year. A 1.8 percent reduction, based on using the larger radius curve at Station 12+450, would reduce the estimated collision frequency by 0.1 collisions per year, for a total of 6.2 crashes per year.

There are several factors that may help mitigate the smaller than desirable radii for the two curves located at Station 12+100 and Station 12+450. On a 3-R project (Resurfacing, Restoration, and Rehabilitation) horizontal curves with radii within 20 km/h (12 mph) of the design speed of the roadway do not require the curve radius to be revised (enlarged), but they do require that all the safety features of the curve be reviewed as well as the accident history. There has only been one recorded accident for the curve at Station 12+100, attributed to driver error (failure to yield). Therefore the curve at Station 12+100 would be allowed to remain as is. In the vicinity of the curve located at Station 12+450 there have been a series of accidents. Between 1996 and 2000, there have been six recorded, non-injury accidents. The six accidents can all be attributed to driver error (four were speed too fast for conditions, one was exceeding the posted speed limit, and one was from improper parking). There are no changes that can be made that to the roadway geometrics that would force a motorist to limit their speed to match the roadway conditions.

Curve widening would be applied to all the curves in the alignment so that long wheel-based-vehicles would be able to drive the curves and remain within their own lane. Installation of guardrail is proposed along the outside of both of the curves. An additional benefit to these widened curves is that passenger type vehicles (cars and pickup trucks) would be able to follow a slightly larger radius through the curves. In addition, a short section of clean jetty rock fill may need to be placed into the lake at approximate Station 12+060 to provide a base for the proposed roadway widening around this sharp curve. Fill placement at this location was discussed with the resource and regulatory agencies during a field review.

The proposed horizontal alignment along the valley, Segment 2, was developed to minimize the impacts to wetlands and to minimize the amount of rock cut excavation on the west side of the roadway. It is anticipated that because of the proposed roadway alignment, realignment of two sections of the existing intermittent Fernan Creek, which flows through a manmade ditch immediately adjacent to the roadway, would be required. These two sections are between MP 2.8 and MP 3.0 (Stations 14+300 to 14+700), and MP 3.55 and 3.9 (Stations 15+600 to 16+100). The concept of realigning and restoring these stream reaches was discussed during a field review with resource and regulatory agencies, which indicated the upper reach should be higher priority.

Vertical Alignment

The proposed vertical alignment along Segment 1 was developed so that the catch points on the right hand side of the road would closely match the existing topography. Several sections of Segment 1 required that the proposed vertical profile be set below the existing ground centerline in order to accommodate a slightly wider roadway surface without adversely impacting the adjacent lake and hillside.

The horizontal limits of construction were developed using the cutslope design recommendations from the project geotechnical report (NTL, 2002). For fill areas or areas that were not completely covered by the NTL report, slope rates were applied that could reasonably be anticipated by the type of material (angle of repose) or slope rates

that are necessary to allow an errant vehicle to safely traverse the slope (generally a 1:3 or flatter). The vertical profile was developed so that the pavement surface would remain at least 0.3 m (1 ft) above the predicted 100-year flood event, which was given as elevation 652.065.

The proposed vertical alignment in Segment 2 was developed in order to best match catchpoints on both sides of the road.

Alternative Fm

Horizontal Alignment

Under Alternative Fm the road would be rebuilt to a typical 7.4 m (25 ft) width and rehabilitated in Segment 3. The proposed alignment veers away from Fernan Lake between MP 1.0 and MP 2.1 (Stations 11+600 and 13+200) and proceeds up and across the adjacent hillside continuing to maintain a curvilinear nature. Alternative Fm then re-joins the existing alignment at approximately MP 2.1, where it predominately follows the existing alignment until reaching the end of Segment 2. In addition, a short section of clean jetty rock fill is proposed to be placed into Lilypad Bay near MP 2.1 (approximately Station 13+310 to Station 13+360) to provide a base for the proposed roadway widening. Placement of the clean jetty rock is necessary to avoid a major cut into the adjacent rock face, thereby preserving one or two potential home sites.

Vertical Alignment

Alternative Fm roughly follows the existing Fernan Lake Road profile for only the first 1.6 km (1.0 mi) of Segment 1 before taking an upland route, which bypasses many of the sharpest horizontal curves along the existing alignment. This route requires relatively steep grades to reach the plateau before descending relatively steeply prior to Lilypad Bay. The maximum grade experienced in Segment 1 for Alternative Fm is 6.0 and 7.5 percent, respectively, where the alignment leaves and rejoins the current road alignment. The ascending and descending steeper grades of this alternative would require consideration for erosion prevention along the ditch slopes and at their bases during final design. Alternative Fm crosses the Lilypad Bay area north of the existing causeway. To maintain safe road grades, the roadway would be located on a very tall fill slope, roughly 15.2 m (50 ft) high.

The proposed vertical alignment in Segment 2 was developed to best match catchpoints on both sides of the road. The are no substantial differences between Alternatives E and Fm for most of this segment.

Alternative G (Preferred Alternative)

Alternative G would be essentially the same as Alternative E except at Lilypad Bay. Alternative G would construct a curved bridge, approximately 118 m (387 ft) long just north of the existing road. The existing fill, roadway, and the one visible culvert between MP 2.1 and MP 2.2 would be removed and rehabilitated.

No Action Alternative (No Road Reconstruction)

Under the No Action Alternative, any major improvements would be made to the existing roadway. The road would not be reconstructed, the road surface would continue to deteriorate, and load listings would continue. Repairs of road failures would occur on an as-needed basis. Inadequate sight distances and varying pavement widths would not be improved. Additional signs, striping, or guardrails could be provided to enhance safety where right-of-way allows. Bare and eroding slopes along the road would not be stabilized and thus would continue to require ongoing maintenance. Stormwater runoff would continue to flow untreated directly into the lake. Finally, no additional turnouts or parking for recreational visitors would be provided. Accident frequency would climb, as traffic volumes grow, compared to the build alternatives.

2.3 SELECTION OF PREFERRED ALTERNATIVE G

FHWA and the partner agencies evaluated the environmental impacts and the advantages and potential disadvantages of Alternatives E, Fm, and G, as well as the No Action Alternative. The evaluation considered both environmental and other factors. Alternative G was the unanimous choice as the Preferred Alternative. Details on the selection factors and overall ratings for the alternatives are presented first. Then brief summaries are provided for each alternative.

Selection Factors

Table 2-1 provides a visual summarization of the factors that led to the unanimous selection of Alternative G as the Preferred Alternative for the Fernan Lake Road Safety Improvement Project. For each factor, the three build alternatives and the No Action Alternative were discussed in terms of environmental impacts or undesirable features as well as potential opportunities to improve current conditions.

Overall Purpose and Need was an assessment of the alternatives relative to the comprehensive list of project objectives. It looked at the overall performance of the alternatives without focusing on any particular objective. Alternatives E and G were rated highest, and the No Action Alternative was rated lowest. Alternative Fm was given an intermediate rating because ESHD felt it did not meet their agency's purpose and need for the project.

Improved Traffic Safety used results of the IHSDM modeling, which predicted similar reductions in accidents for Alternatives E, Fm, and G when compared to the existing road (No Action). All three build alternatives were given the highest rating because the model predicted they would all have fewer accidents than other preliminary designs using ASSHTO and ITD standards (alternatives not carried forward for analysis, see Section 2.5), which only showed minor accident reduction from the existing road.

Physical Environment considered geology, soils, hydrology, and water quality. All four alternatives were given moderate ratings. The build alternatives would have short-term impacts but offered potential for long-term improvement, especially in water quality.

The converse was true for the No Action Alternative, which would avoid short-term impacts but forego opportunities for long-term improvement.

Table 2-1. Summary of Preferred Alternative Selection

Selection Factor	Alt-E	Alt-Fm	Alt-G	No Action
Overall Purpose and Need	●	◑	●	○
Improved Traffic Safety	●	●	●	○
Physical Environment	◑	◑	◑	◑
Biological Environment	○	◑	●	◑
Human Environment	○	○	◑	●
Improved Road Maintenance	●	◑	●	○
Constructability	●	◑	●	●
New Right-of-Way Required	◑	○	◑	●
Degree of Risk or Uncertainty	○	◑	●	●
Overall Preference	◑	○	●	○

● Least impact and/or greatest opportunity
◑ Moderate impact and/or opportunity
○ Greatest impact and/or least opportunity

Biological Environment considered fish, wildlife, and plant populations and habitats, as well as wetlands. Alternative E was rated lowest because of the in-water construction required to build the bridge across Lilypad Bay and the potential for noise impacts on the nesting bald eagles. Alternative Fm was rated moderate because habitat would be disturbed by construction of the new road alignment between MP 1.0 and MP 2.1. Alternative G rated highest because it would have the least short-term impacts of the three build alternatives while still restoring connectivity in the upper portion of Lilypad Bay, an opportunity for long-term improvement that the No Action Alternative would not provide.

Human Environment considered impacts versus opportunities primarily related to land use, noise, recreation, and visual quality. No Action was rated highest because there would be no short-term construction impacts or long-term changes in visual qualities. Alternatives E and Fm rated lowest. Alternative E would have prolonged noise impacts from driving deep bridge pilings from a barge near the mouth of Lilypad Bay and moderate visual impacts of the new bridge. Alternative Fm would have visual impacts in

new places part way up Fernan Hill between MP 1.0 and 2.1, and from the high fill north of Lilypad Bay. Alternative G was the most consistent with existing conditions.

Improved Road Maintenance was rated highest for Alternatives E and G, and lowest for the No Action Alternative. Alternative Fm was given a moderate rating because it would add moderately steep grades for ESHD to maintain. The No Action Alternative would not provide any long-term improvement in road maintenance.

Constructability looked at estimated cost to build relative to available funds, and for conditions or situations that might make construction challenging or prolonged. Although all build alternatives are feasible to construct, Alternative Fm was given a moderate rating because of the extent of cut- and fill-slopes that would be constructed between MP 1.0 and 2.1. Alternative E was rated high for this factor in spite of uncertainty of bridge construction in open water with undefined bottom conditions, because another selection factor specifically considers risk and uncertainty.

New Right-of-Way Required would be greatest, and thus was rated lowest, for Alternative Fm because of the new side-slope alignment for approximately one mile. The No Action Alternative rated highest for this factor because no new ROW would be required. Alternatives E and G were given moderate ratings.

Degree of Risk or Uncertainty looked at potential conditions or situations that could delay or complicate final design and permitting, or that could cause interruptions during construction. By default the No Action Alternative was considered to have the least risk or uncertainty and thus was rated highest for this factor. Alternative G was given a similar rating because it is the build alternative that most closely follows the existing road alignment. Alternative E was rated lowest because the total length of the bridge pilings would not be determined until final design; the bridge location is nearest to the open lake and the bald eagle nest on the south shore; and there is potential to encounter creosote-treated timbers from the original bridge during construction. Alternative Fm was given a moderate rating because there would be new construction on steep slopes and some reconstructed driveway approaches could have steep grades. Also it is not clear at this time whether the easements along the lake between MP 1.0 and MP 2.1 would revert to the respective private landowners or remain with a public agency when the existing road is obliterated.

Overall Preference of Alternatives

Alternative G had either highest or moderate ratings for all factors considered in selecting the preferred alternative. Alternative G was unanimously selected by FHWA and the partner agencies as the preferred alternative for the Fernan Lake Road safety improvement project. This alternative would most closely follow the existing road alignment. Construction of the new curved bridge across Lilypad Bay would occur behind the existing causeway, thus protecting the lake from related short-term impacts to water quality. Alternative G would have fewer visual impacts than the other two build alternatives. All of the improvements in traffic safety, stormwater treatment, roadway

maintenance, and parking along the lake that are found in the other build alternatives would be provided by Alternative G.

Alternative E also received many favorable comments in discussions among the partner agencies. Putting a new bridge were the original one was located would shorten the overall route and eliminate three of the curves where accidents (one fatal) have occurred. It also would provide an opportunity to create additional parking near Lilypad Bay. Most disadvantages of Alternative E are related to driving the pilings for the new bridge, such as uncertain depth to bedrock, noisy construction, potential to encounter creosote-treated timbers from the original bridge. Safety concerns related to the public probably fishing from the open water bridge were considered 'a significant issue.'

The No Action Alternative was not considered the preferred alternative. Even though it had similar numbers of high, medium, and low ratings as Alternative E, it clearly failed to meet the purpose and need for the project. Although No Action would avoid impacts of construction, there would be no improvement in safety, road maintenance, and stormwater treatment.

Alternative Fm also was not considered the preferred alternative. This alternative would route traffic over a hill and create new maintenance concerns for ESHD, including winter plowing and maintenance of large cut/full slopes. The preliminary design does not follow natural contours in some places, and thus would result in substantial cut- and fill-slopes to construct the road between MP 1.0 and MP 2.1. The elevation of the proposed road in this area would require a visually conspicuous approximately 15.2 m (50 ft) high fill north of Lilypad Bay, which would also obstruct the lake view from at least one residence. The potential advantages of realigning part of the road away from the lake were not considered adequate to offset the disadvantages of Alternative Fm.

2.4 ACTIVITIES AND FACILITIES COMMON TO ALL BUILD ALTERNATIVES

The following general description of construction activities and impacts applies to all build alternatives and segments unless otherwise noted. Construction would begin with clearing of vegetation along the roadway within the roadway easements. Chainsaws would be used to fell trees, which would be placed in the lake for fish habitat. Hydraulic excavations would be used for removing scrub and stumps. Debris would be rolled, dragged, or otherwise deposited on Fernan Lake Road, where it would be loaded onto dump trucks for removal to a disposal or burn site. The contractor would determine (the location of a disposal site or sites.) The road would be closed at the working location for no more than four-hour periods at a time.

For most of Segment 1 and part of Segment 2 there would be significant cuts into the existing steep slopes along the road corridor to allow for the wider road. Some of the cut material would be used to raise the grade of the road and to create embankments. However, more material would be removed than can be used along the road. The contractor would dispose of the excess cut material.

The method for excavating the slope would depend on whether the slope is made up of loose or crumbly rock or hard, solid rock. A hydraulic excavator would be used to break up and excavate topsoil and crumbly rock. Excavation of solid rock would require drilling and blasting. The blasting would be done along the road in increments of approximately 50 m (164 ft), so that no more debris is generated than can be removed by trucks within four hours. This is typically 300 to 600 m^3 (392.4 to 784.7 cy^3).

Constructing the bridge across Lilypad Bay would create construction impacts in Alternatives E and G that would not occur under Alternative Fm. Construction of the abutment foundations and pilings to support the bridge superstructure would first require cofferdam construction to form an enclosure. Earth would be removed from the enclosure and a de-watering system would be used to remove water from the construction site. The foundation and supports would then be built of concrete. Groundwater removed by the dewatering system from the bridge construction site would be pumped to a temporary detention and treatment pond before release to the lake or infiltration to groundwater. After the bridge (Alternatives E and G) or road (Alternative Fm) is built around the bay, the fill that supports the existing Fernan Lake Road across the bay would be removed. The existing roadway fill would serve as a filter for any accidental sediment release during construction of the new road or bridge (with the exception of Alternative E because its alignment is downstream and lakeward of the existing causeway).

To relocate Fernan Creek in Segment 2 as proposed in Alternatives E, Fm, and G, a new stream channel would be excavated on dry land, leaving a short distance of unexcavated earth at each end. Matting and other stabilization methods would be used to minimize erosion on the new channel banks. When the water is to be diverted to the new channel, the remaining earth between the new and old channel is removed. Plastic sheeting and sandbags are placed over the connection to the previous channel to complete the process of diversion and minimize erosion and turbidity. Excavated material from the road work or channel construction would be used to fill in the old channel.

In Segment 3, the project proposes to follow the existing roadway alignment and rehabilitate its pavement section. In this segment, most of the work consists of driving a specialized piece of equipment called a rotomiller reclaimer over the road surface. The reclaimer chews up the road surface to a pre-determined depth. The resulting mixture of old asphalt and rock is deposited on the road surface behind the reclaimer. This mixture is graded and compacted to create a new subsurface. Depending on the quality of the mixture, additional new asphalt or aggregate may be added to create an optimal consistency. The new subsurface is then paved over. Culverts would either be relined or else would be replaced using a hydraulic excavator. If there were water running through the existing culvert, water would be diverted through a pipe or via a hydraulic pump to a temporary impoundment area.

In terms of construction sequencing, the project would probably begin with the rehabilitation of Segment 3 and move downhill towards Coeur d'Alene.

2.5 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM CONSIDERATION

Ten alternative routes that avoid part (Routes 1, 2, and 3) or all of the current Fernan Lake Road were evaluated, but none were considered practical or prudent. Four of the seven preliminary designs that use the existing road alignment were not carried forward for analysis in this EIS. Two early designs would have required extensive lake encroachment and other impacts considered unacceptable. Two subsequent narrower designs showed less than a 23 percent reduction from the current road in collisions predicted by IHSDM.

Alternative Routes

Figure 2-2 is a map showing the ten alternative routes, some of which have sections in common. The map also differentiates existing paved roads from gravel roads from relatively narrow driveways and lanes or where an entirely new road would need to be developed.

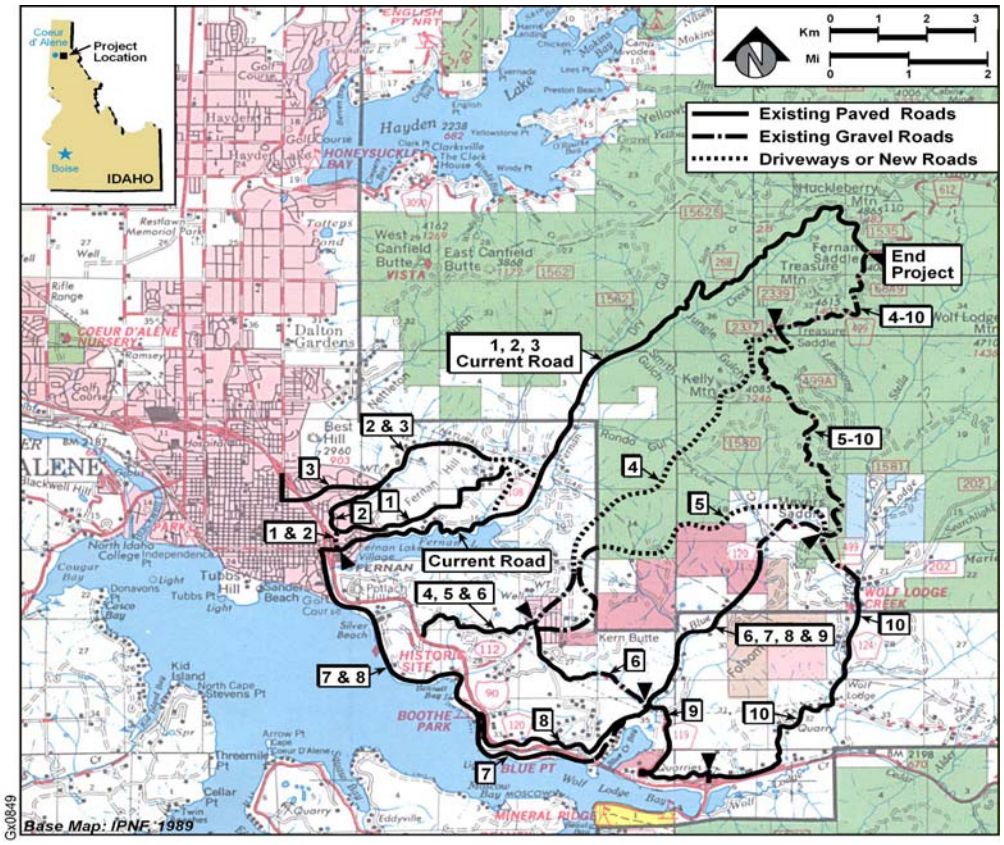
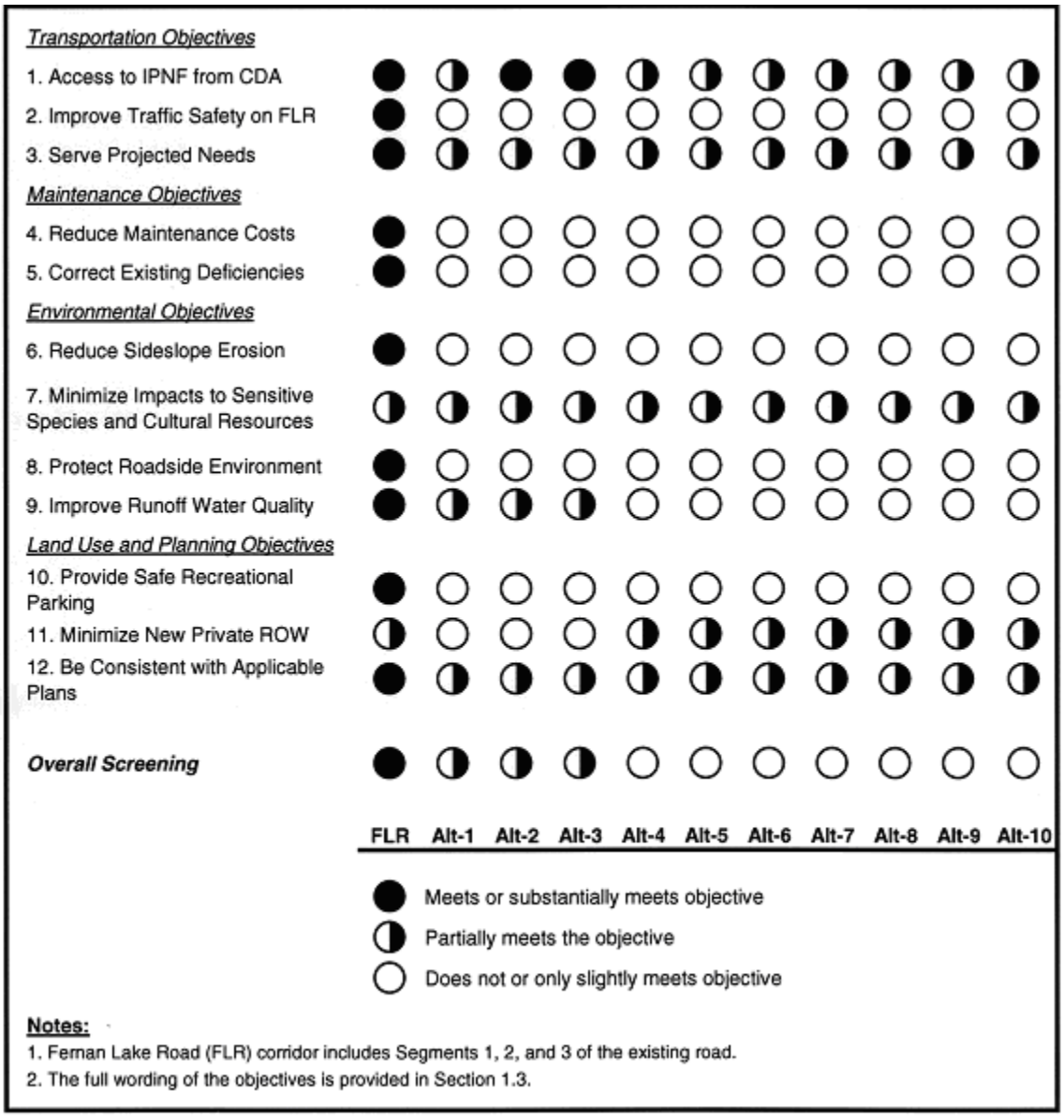


Figure 2-3. Alternative Routes Considered but Eliminated

Table 2-2 is a visual summarization of screening the ten alternative routes for each of the twelve project objectives. Similar ratings are provided for the Fernan Lake Road Corridor as a comparison. Additional details on results for each screening criterion and route are presented in Appendix B. Chapter 5 also discusses these routes in the context of Section 4(f) requirements.

Table 2-2. Summary of Screening Alternative Routes and Fernan Lake Road Corridor



Notes:
1. Fernan Lake Road (FLR) corridor includes Segments 1, 2, and 3 of the existing road.
2. The full wording of the objectives is provided in Section 1.3.

Route 1

This route would provide access to I-90 at Sherman Avenue. Just east of the interchange the route would follow Lilac Lane north, then require a new road approximately 0.2 km (0.1 mi) be constructed up the west end of Fernan Hill to connect with Fernan Hill Road. A new road approximately 1.4 km (0.9 mi) long would be needed from the eastern end of Fernan Hill Road, down the hill and along a driveway, to Fernan Lake Road at the east edge of Lilypad Bay. This route would then follow the existing road through Segments 2 and 3 to Fernan Saddle.

Route 1 is 1.9 km (1.2 mi) longer to Fernan Saddle than the current road and avoids most of Segment 1 where the majority of accidents have occurred. Safety would remain a concern because it has steep grades, especially at the new connection between Lilac Lane and Fernan Hill Road, it introduces logging trucks and recreational vehicles to residential neighborhoods, and school buses currently use the route. Existing maintenance requirements, parking problems, and stormwater treatment deficiencies in Segment 1, most of which would need to remain in service, would not be corrected if Route 1 were built. New ROW requirements would likely impact four houses on Lilac Lane and ten houses and two garages on Fernan Hill Road.

Alternative Route 1 is feasible, but not practical or prudent. Of special concern is the introduction of large commercial vehicles and long recreational vehicles to a residential neighborhood on a route used by school buses. The City of Coeur d'Alene has opposed this route for these reasons. Thus the SEE team eliminated Route 1 from further consideration.

Route 2

Alternative Route 2 also connects with I-90 at Sherman Avenue, goes north on Lilac Lane, and then requires a new road up the west end of Fernan Hill. This route then continues north to French Gulch Road, which it follows to Stacel Draw. Approximately 1.8 km (1.1 mi) of new road would between the east part of French Gulch Road and Fernan Lake Road at approximately MP 3.2. The route then would follow the remainder of Segment 2 and 3 to Fernan Saddle.

This route is only slightly longer (0.4 km, 0.3 mi) between I-90 and Fernan Saddle than the current road. As is the case with Alternative Route 1, many of the potential safety benefits of directing traffic away from Segment 1 are offset by new concerns of Route 2 introducing logging trucks and recreational vehicles into residential neighborhoods where school buses run. All of the current problems and deficiencies in Segment 1 would remain uncorrected, as would those in the first 1.6 km (1.0 mi) of Segment 2. Four houses on Lilac Road and one on the connection to French Gulch Road would be required for ROW.

Alternative Route 2 is feasible, but neither practical nor prudent, for many of the same reasons listed for Route 1. The City of Coeur d'Alene has also opposed this route. Thus the SEE team eliminated Route 2 from further consideration.

Route 3

Route 3 would connect with I-90 at the 15th Street interchange, then proceed south on 15th Street, east on East Elm Avenue, northeast on Stanley Hill Road, and east on East Harrison Avenue to French Gulch Road. It would then be the same as Route 2 to Stacel Draw and Fernan Lake Road to Fernan Saddle.

This route is 0.9 km (0.6 mi) longer than the existing road from I-90 to the saddle. Of all the alternative routes, this one makes the most use of city streets and residential neighbor hoods. Requirements for new ROW would affect two apartments, three businesses, a church, and a golf club. The City of Coeur d'Alene has stated opposition to this route. Alternative Route 3 was eliminated from further consideration by the SEE team for the same reasons that Routes 1 and 2 were eliminated.

Route 4

This route would connect with I-90 at the Mullan Trail Road interchange and proceed east on Mullan Trail Road for approximately 2.6 km (1.6 mi). It would then go northeast for 10.0 km (6.2 mi) to Treasure Saddle, first on gravel roads, but mostly on a new road. The route would then follow FS Road (FR) 499 to Fernan Saddle. Fernan Lake Road is not used at all.

This alternative is the shortest route between I-90 and Fernan Saddle (15.8 km, 9.8 mi), but the total distance from Coeur d'Alene (Sherman Ave exit) is greater than the existing route by 0.9 km (0.6 mi). Route 4 would require the most new road construction, much of it in steep terrain and at relatively high elevations near the Fernan watershed boundary. The new road would cross undisturbed woodlands and elk wintering ground, and its ridgeline location would affect two watersheds instead of one. Most of the route is on IPNF, but new ROW requirements could affect two wells, a water tank, and ESHD buildings.

None of the existing deficiencies and problems of Fernan Lake Road would be corrected if Route 4 were constructed. ESHD would need to maintain both the existing road and the new route. Because the route tends to follow the ridgeline, much of it would be snow-covered and difficult to keep open in winter. Constructing approximately 8.3 km (5.0 mi) of new road in difficult terrain would cause total costs to far exceed the current budget for the project.

The SEE team eliminated Alternative Route 4 from further consideration because it would cost much more than the available budget to build; it would be difficult to keep open year round, and would not correct any of the problems and deficiencies of the current road, thereby failing to meet the purpose and need for the project. Thus although feasible to build, this route was not considered practical or prudent.

Route 5

Route 5 would also start at the Mullan Trail Road interchange on I-90 and follow the same roads as Route 4 for the first 2.6 km (1.6 mi). It would then leave known roads in the vicinity of Captain John Mullan Road and require approximately 7.5 km (4.5 mi) of

new road along another ridgeline running north and east to Meyer's Saddle. This route would then follow FR 499 for 10.0 km (6.2 mi) to Treasure Saddle and Fernan Saddle.

This route to Fernan Saddle is 22.2 km (13.8 mi) from I-90 and 25.3 km (15.7 mi) from Coeur d'Alene at Sherman Avenue. It would have steep grades and sharp curves, with the switchback at Meyer's Saddle being very difficult to correct. Much of the route would be at high elevations that would be snow-covered and difficult to keep open in winter. Many travelers to Fernan Saddle would probably continue to use Fernan Lake Road rather than this longer route. As was the case with Route 4, construction costs for new road would increase total costs far beyond the current budget for this project.

Alternative Route 5 is feasible, but not practical or prudent. It was eliminated from further consideration by the SEE team for the same reasons that Route 4 was eliminated.

Route 6

This route is the same as Routes 4 and 5 for the first 2.6 km (1.6 mi). Then it follows Sunnyside Road southeastward for 3.7 km (2.3 mi) to Blue Creek Road, which it follows northeastward for 6.4 km (4.0 mi) to Meyer's Saddle. The last 10 km (6.2 mi) is on FR 499 to Treasure Saddle and Fernan Saddle.

The distance on Route 6 to Fernan Saddle is 22.7 km (14.1 mi) from I-90 and 25.7 km (16.0 mi) from Coeur d'Alene at Sherman Avenue. This alternative has many of the disadvantages of Routes 4 and 5, plus it could affect historic resources in the community of Blue Creek. Although new ridgeline roads would not need to be constructed, the overall length of required improvements would increase total costs well beyond the project budget, while at the same time decreasing the probability that travelers to Fernan Saddle would chose this route over Fernan Lake Road.

The SEE team eliminated Alternative Route 6 from further consideration because it would cost too much to build, it would be difficult to keep open year round, it would probably not attract travelers to Fernan Saddle, and would not correct any of the problems and deficiencies of the current road, thereby failing to meet the purpose and need for the project. Also a purpose of Forest Highway Program is to provide a link between the NFS lands and nearby communities like Coeur d'Alene. Increasing the route by nearly 45 percent would not be consistent with the program. Thus although feasible to build, Route 6 was not considered practical or prudent.

Route 7

Route 7 connects with I-90 at Sherman Avenue, proceeds south along Centennial Trail (also known as Lake Coeur d'Alene Drive) for 6.0 km (3.7 mi), and then crosses under I-90 and continues east along Yellowstone Trail Road for 4.2 km (2.6 mi) to Sunnyside Road and Blue Creek Road. The remaining 16.4 km (10.2 mi) is the same as Route 6.

This route is 27.4 km (17.0 mi) long. In addition to the problems it has in common with Route 6, Route 7 would increase traffic along the Lake Coeur d'Alene shoreline and introduce logging trucks and recreational vehicles towing trailers to the residential

neighborhood at Blue Creek Bay. Should travelers to Fernan Saddle chose to use this route, even though it's more than 45 percent longer than the current road, traffic related pollution would be shifted from Fernan Lake to Lake Coeur d'Alene. Requirements for new ROW would possibly impact four old houses and three old barns.

Alternative Route 7 is feasible to build, but it not practical or prudent. The SEE team eliminated this route from further consideration because it would cost too much to build; it would be difficult to keep open year round, it would probably not attract travelers to Fernan Saddle, and would not correct any of the problems and deficiencies of the current road, thereby failing to meet the purpose and need for the project.

Route 8

Route 8 is very similar to Route 7, but continues on Centennial Trail (Coeur d'Alene Lake Drive) for another 4.5 km (2.8 mi) before crossing I-90 and constructing a new connection to Yellowstone Trail Road. New ROW required for construction would impact two home and three barns.

The SEE team eliminated Alternative Route 8 from further consideration for the same reasons Route 7 was eliminated. Although feasible to build, this alternative is neither practical nor prudent.

Route 9

Alternative Route 9 would connect with I-90 at the Wolf Lodge Bay interchange. It would follow Yellowstone Trail Road west and north for 3.7 km (2.3 mi), then connect with Blue Creek Road and follow the same roads as Route 6 to Fernan Saddle.

The distance to Fernan Saddle for Route 9 is 20.1 km (12.5 mi) from I-90 and 31.1 km (19.3 mi) from Coeur d'Alene at Sherman Avenue. Thus travelers to Fernan Saddle from the east on I-90 might use this route, but Fernan Lake Road would continue to be a much shorter route from Coeur d'Alene. High visual impacts would be likely from the rock cliff cut needed to upgrade Yellowstone Trail Road. New ROW needed for construction would impact three old barns.

Route 9 is feasible to construct, but neither practical nor prudent. The SEE team eliminated this route from further consideration because it would cost too much to build; it would be difficult to keep open year round; it would have high visual impacts near I-90; it would probably not attract travelers from Coeur d'Alene to Fernan Saddle, and would not correct any of the problems and deficiencies of the current road, thereby failing to meet the purpose and need for the project.

Route 10

Route also connects with I-90 at the Wolf Lodge Bay interchange, but then follows a frontage road east and Wold Lodge Creek north for 8.9 km (5.5 mi) to Meyer's Saddle. It follows FR 499 north to Treasure Saddle and Fernan Saddle.

The distance for this route to Fernan Saddle is 18.8 km (11.7 mi) from I-90 and 29.8 km (18.5) mi from Coeur d'Alene at Sherman Avenue. As was the case with Route 9, travelers from the east on I-90 may prefer this route to Fernan Saddle, but those from Coeur d'Alene would probably continue to use Fernan Lake Road. This route shares many of the disadvantages of Routes 4 through 9. In addition Road widening is likely to affect Wolf Lodge Creek which contains cutthroat trout. ESHD currently has ROW to the IPNF boundary along this route. New ROW requirements may affect one garage.

The SEE team eliminated Alternative Route 10 from further consideration because it would cost too much to build; it would be difficult to keep open year round; it would probably not attract travelers from Coeur d'Alene to Fernan Saddle, and would not correct any of the problems and deficiencies of the current road, thereby failing to meet the purpose and need for the project. Although this alternative is feasible, it would not be practical or prudent to construct.

Alternative Preliminary Designs

Preliminary designs were completed for Alternatives A, B, C, and D that use the existing route along Fernan Lake Road to Fernan Saddle. All were based on wider design standards for lanes, shoulders, and curve widening than Alternatives E, Fm, and G, which are analyzed in this EIS. To some extent these alternatives represent early stages in the evolution of the alternatives finally selected for analysis. None of these alternatives used IHSDM during preliminary design, although the predicted safety performance of Alternatives B and D was subsequently analyzed with the model.

Alternatives A, B, C, and D were eliminated from detailed analysis in this EIS because IHSDM showed that wider roadways, which would result in greater environmental impacts, failed to improve safety as much as the narrower roadways of Alternatives E, Fm, and G.

Alternative A

Under this alternative the road in Segments 1 and 2 would be reconstructed to a uniform width of 9.6 m (32 ft) using approximately the same alignment as the existing road. This alternative would fully meet ASSHTO standards for width and curve design. The road in Segment 3 would remain at its current width of 7.6 m (25 ft). Existing deficiencies in horizontal and vertical alignments would be reduced or eliminated, and sight distance would be improved to allow a 60 km/h (35 mph) design speed for all of Fernan Lake Road.

This alternative would require substantial work along the lakeshore, including cutting of hillsides and placement of fill into Fernan Lake to provide sufficient width for road pavement and shoulders. Former roadway area along the lake would be available for parking where hillsides would be cut to flatten curve radii. A curved bridge would replace the current fill and roadway across Lilypad Bay.

Alternative A would require acquisition of more ROW through private land than other build alternatives considered, and residences along the lake would be affected. The

substantial hillside cuts would be costly and would alter the visual appearance of the north shore until vegetation is re-established. More wetlands would be impacted in Segment 2 and more length of Fernan Creek channel would be altered.

If at all possible, FHWA designs Forest Highway improvements to meet or exceed minimum standards of ASSHTO. The SEE team decided this approach was not practical or prudent for Fernan Lake Road improvements because of the sensitivity of the surrounding environments, the desire to avoid physical impacts to the greatest extent possible, and the desire to minimize taking private property for new ROW requirements. Thus Alternative A was not carried forward for full analysis in the NEPA process.

Alternative B

Alternative B would roughly follow the existing road and widen the roadway approximately evenly on both sides. The road would be reconstructed between MP 0.0 and MP 5.0 to a uniform 8.4 m (28 ft) paved width and rehabilitated at its current width of 7.6 m (25 ft) between MP 5.0 and MP 10.7.

Reconstruction would include excavation of adjacent slopes, placement of fill material, construction of retaining walls, grinding up the existing surface, placement of new base material, new pavement, placement of gravel on the shoulders, relocation of utilities, installation of guardrails, striping, installation of advisory signs, and revegetation of disturbed areas.

In order to gain additional width, reduce the hazard of flooding, and dispose of some of the material generated by cutting into the slopes to permit the road widening, the roadbed would be raised. The grade change would be minor in Segment 1 (less than 0.5 m or 1.5 ft), except at Lilypad Bay where the grade would be raised up to 1.5 m (5 ft) leading up to a bridge to replace the existing fill across the bay.

In Segment 2, in order to raise the road above the predicted 100-year flood elevation, the road elevation would be raised as much as 2 m (6 ft) in places. Construction of the raised roadway would require moving one channel of Fernan Creek that is located immediately adjacent to the roadway in two places, MP 2.8 to MP 3.0 and MP 3.55 to MP 3.9. It appears that the channel has been moved before by landowners wishing to maximize field area. Moving the creek would involve:

- designing and excavating a new channel with appropriate meanders in two places;
- compacting or sealing the channel bottom to keep water in the stream during times of low flows;
- adding cobble and woody debris to the bottom of the stream to provide cover for fish and micro-invertebrates;
- planting appropriate native plants along the banks of the new channel; and

- blocking the old channel and directing stream flows to the new channel.

Alternative B would involve construction of 15 retaining walls in Segment 1 and no retaining walls in Segment 2. Ten of those walls would be located between the roadway and the lake. They would be either gabion or soldier pile fill-side retaining walls. The highest fill-side retaining wall would be 6.5 m (21 ft) and the average height of all fill-side retaining walls is 3.5 m (11 ft). In order to construct these walls, most of the vegetation between the roadway and the lake would have to be removed. As a result, the retaining wall and the new road would be clearly visible from the lake and property across the road on Potlatch Hill.

Alternative B would also involve construction of five cut slope retaining walls. The average height of these walls would be 5.5 m (18 ft) and the maximum height of a retaining wall would be 11.5 m (37 ft). This wall would be at approximately MP 1.2 where the road curves around a point with a home on it. The wall is needed in order to minimize disturbance to this property.

Alternative B includes construction of four pullout/parking areas for visitors along the lake frontage. These would be created in areas where the realignment of the road leaves the existing roadway available for use as a pullout. Directing visitors to park in designated areas should minimize disturbance of other areas and increase the safety for visitors.

In Alternative B a curved bridge located just north of the existing fill would replace the existing fill across Lilypad Bay. The bridge would allow natural hydraulic flows to re-establish in the area. Two streams cross the road in Segment 2, Stacel Draw (MP 3.5) and Dry Gulch (MP 5.0). The culverts that carry these creeks are badly corroded and would be replaced.

Segment 3 (MP 5.0 to MP 10.7) would be rehabilitated under this alternative. The existing road surface would be ground up and a new surface would be laid. The road width (approximately 7.6 m or 25 ft) would remain the same. Rehabilitation would include fixing seven minor slump areas and installation of safety improvements (such as warning signs and striping) in some areas. Culverts would be relined but not replaced, and drainage facilities would not be improved.

Alternative B was eliminated from detailed analysis in this EIS because IHSDM showed that wider roadways, which would result in greater environmental impacts, failed to improve safety as much as the narrower roadways of Alternatives E, Fm, and G.

Alternative C
Reconstruct Segments 1 and 2 to 28 feet Width and Correct Curves; Rehabilitate Segment 3

This alternative is similar to Alternative B. However, to further reduce impacts, this alternative would reduce the roadway width to 8.4 m (28 ft) and include minimal curve correction. AASHTO exceptions would be required for the roadway width and curves.

This alternative would widen and reconstruct the existing roadway between MP 0.0 and MP 5.0 to 8.4 m (28 ft). At specific locations, narrow curves would be engineered to improve safety although curves would not be eliminated. Corroded drainage facilities would be replaced and limited off-road parking would be provided. Between MP 5.0 and Fernan Saddle (MP 10.7), the road surface would be rehabilitated at its current width of 7.6 m (25 ft).

Alternative C would provide certain safety benefits by resolving some of the existing safety problems associated with tight curves, narrow pavement, inadequate sight distance, and deteriorating pavement conditions. Maintenance operations would be reduced. This alternative would require acquisition of some ROW through private property, though not as much as Alternatives A or B, because the correction of substandard horizontal and vertical alignment would be limited. The hillside cuts would be costly and would alter the appearance of the north side of the lake until vegetation is re-established. Placement of fill in Fernan Lake would be required with potentially adverse effects on fish.

Alternative C was eliminated from detailed analysis in this EIS because IHSDM showed that wider roadways, which would result in greater environmental impacts, failed to improve safety as much as the narrower roadways of Alternatives E, Fm, and G.

Alternative D
Realignment in Part of Segment 1

Alternative D would roughly follow the existing road for the first 1.9 km (1.1 mi) and then realign the road to the north, away from Fernan Lake, rejoining the existing alignment northeast of Lilypad Bay (MP 2.2). The realignment would avoid three very narrow curves at approximately MP 1.2, MP 1.4 and MP 1.7.

This alternative would widen the roadway primarily to the north along Segment 1 to avoid disturbing vegetation along the lake. Protecting the existing lakeside vegetation would help to minimize the visual impacts of the road improvements from the lake and homes on Potlatch Hill. The vegetation also functions to trap sediment and cleanse run-off from the road.

The road would be reconstructed between MP 0.0 and MP 5.0 to a uniform 8.4 m (28 ft) paved width and rehabilitated at its current width of 7.6 m (25 ft) between MP 5.0 and MP 10.7.

Reconstruction would include excavation of adjacent slopes, placement of fill material, construction of retaining walls, grinding up the existing surface, placement of new base material, new pavement, placement of gravel on the shoulders, relocation of utilities, installation of guardrails, striping, installation of advisory signs, and revegetation of disturbed areas.

Because Alternative D would avoid disturbance between the existing road and the lake and would realign the road away from the lake for half of Segment 1, this alternative would involve construction of fewer retaining walls. A total of seven retaining walls

would be needed, six in Segment 1 and one in Segment 2. Only two of the walls in Segment 1 would be located between the roadway and the lake. They would be either gabion or soldier pile fill side retaining walls. The highest fill-side retaining wall would be 1.0 m (3.2 ft) and the average height of all fill-side retaining walls is 0.5 m (1.6 ft).

Alternative D would also involve construction of five cut slope retaining walls in Segment 1. The average height of these walls would be 5 m (16 ft) and the maximum height of a retaining wall would be 15 m (48 ft). This wall would be along the west shore of Lilypad Bay, to support the realigned road as it came down to join the existing road. The wall is needed in order to minimize disturbance to adjacent property. This wall would not be visible from most of Fernan Lake.

Alternative D includes construction of two pullout/parking areas for visitors, one along the lake frontage at MP 0.4 and one adjacent to the Fernan Boat Launch (MP 2.2). Pullouts would be created in areas where the realignment of the road leaves the existing roadway available for use as a pullout. By directing visitors to park in designated areas, the FS and ESHD hope to minimize disturbance of other areas and increase the safety for visitors.

The existing roadway easement between MP 1.1 and MP 2.0 would probably revert to the property owner, unless the FS, ESHD or another public agency purchased a portion of the roadway for public use. If the easement reverted to the property owner, then the Fernan Fishing Dock would have to be relocated, and public access to the lake frontage between MP 1.1 and MP 2.0 would be eliminated.

In Alternative D the realigned road would not cross Lilypad Bay, but would cross the two unnamed streams that feed into the bay from the north. The existing fill would be removed and the streams would cross under the road in culverts. Removal of the fill would allow natural hydraulic flows to re-establish in the area.

Two streams cross the road in Segment 2, Stacel Draw (MP 3.5) and Dry Gulch (MP 5.0). The culverts that carry these creeks are badly corroded and would be replaced under Alternative D as under Alternative B.

Segment 3 (MP 5.0 to MP 10.7) would also be rehabilitated under Alternative D. That is, the existing road surface would be ground up and a new surface would be laid. The road width (approximately 7.6 m or 25 ft) would remain the same. Rehabilitation would include fixing seven minor slump areas and installation of safety improvements (such as guardrail) in some areas. No culverts would be replaced and drainage facilities would not be improved.

Alternative D was eliminated from detailed analysis in this EIS because IHSDM showed that wider roadways, which would result in greater environmental impacts, failed to improve safety as much as the narrower roadways of Alternatives E, Fm, and G.